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ABSTRACT

With the aim of revitalizing conservation education, a conceptual framework for natural resource education was constructed, and a procedure established for integrating this curriculum with existing courses of study in the elementary school. A basic theme was chosen, expressed as "man + natural resources = survival + development." Twelve broad understandings which contribute to this theme were identified, each serving as a focus for many concepts. Concepts and broad understandings were organized into a hierarchical structure. An integrated program was developed by identifying relevant concepts and materials in existing science and social studies courses, and building these into a sequence giving spiral concept development. Suggested learning experiences were included. This report reviews the literature on Conservation and Environmental Education and on Attitude Education. This work was prepared under an ESEA Title III contract. [Not available in hardcopy due to marginal legibility of original document.] (EB)

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A Plan and Design For Natural Resources Education

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By

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Natural Resources Education
And Demonstration Center

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CHAPTER I

THE PROBLEM OF VITALIZING CONSERVATION EDUCATION

There exists in the United States and in the world a grave and subtle conservation challenge--one that has implications for the prosperity and even survival of mankind. The challenge is that of an exploding population, a shrinking allotment of space per person, the inevitable conflict of apportioning available space, and how to make natural resources available to all while yet preserving environmental quality.

The challenge to education cannot be denied. According to Secretary of the Interior, Udall, "the concept of conservation cannot be isolated on little islands of awareness. It must become universally accepted as a familiar, taken-for-granted part of everyday life. Only thus can the 'golden days balance' we now enjoy be preserved."[1] In meeting this challenge, education must present conservation as realistic, practical, and far-sighted public policy worthy of concern by an informed electorate. The approach must be broad-based and relevant

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[1]United States Department of the Interior, Quest for Quality (Washington, D.C.: United States Department of the Interior, 1965), p. 8.

to both rural and particularly urban societies. It must truly be environmental education--the study of man in relation to his environment.

I. THE PROBLEM

Statement of the problem. The problem is to develop a plan and a design for the integration of natural resources education into existing science and social studies curricula of the elementary schools of DeKalb County, Illinois. It is also an attempt to satisfy the need for a new approach to natural resources and conservation education.

Two directions were possible in pursuing the study: (1) the construction of a conceptual framework for natural resources education and the establishment of a procedure for integrating the curriculum with existing courses of study, and (2) investigation of methods and techniques for teaching toward attitudes and values necessary for an appreciation of natural resources. The former is pursued in depth in this paper. The latter, except for a brief review of pertinent literature, is essentially reserved for further study. The cultivation of particular attitudes and values is recognized, however, as being critical to the success of a program of natural resources

education. A conceptual framework can be implemented only to the extent that successful methods of education for attitudes exist or can be devised.

Two main tasks emerged: (a) to develop an integrative conceptual structure having scope and sequence for children of primary, intermediate, and upper elementary developmental levels, and (b) to apply the developed curriculum structure, to be known as Natural Resources Education, to existing science and social studies curricula in the DeKalb County Schools. The following procedures will be used to accomplish the foregoing tasks:

1. Identify the basic structure of natural resources education.
2. Express basic structure as a series of broad understandings.
3. Specify concepts that contribute to the broad understandings.
4. Analyze the science and social studies programs for the purpose of identifying natural resources and conservation elements in the existing curricula.
5. Correlate relevant content with natural resources concepts.

Purposes of the study. Specifying a new approach implies an indictment of the old. Conservation is taught in the schools of DeKalb County in textbook or teacher-constructed units once or twice in the upper elementary grades and again in junior high and high school science and social studies (government) classes. Units usually have a two or three week duration. This is typical of other school systems in the experience of the researcher (six systems in four states). In contrast, the curriculum plan for Natural Resources Education will seek to supplement or even eliminate the unit approach to the teaching of natural resources concepts. Concepts will correlate with and accompany relevant content in existing science and social studies curricula at all elementary levels, kindergarten through grade six.

This study will not attempt to duplicate new and exemplary programs of conservation education. It will attempt to develop a plan and a design that will adapt itself to the diversity found in the curricula of Northern Illinois schools. The DeKalb County Schools will serve as a pilot area for the developing curriculum and a yardstick against which to measure the emerging plan and design.

Although the prime ingredient of curriculum--children in interaction--is missing, this discussion of curriculum structure assumes the eventual presence of children and teachers, therefore, it is appropriate to proceed in terms of human needs.

Conservation education, or Natural Resources Education, as it is here conceived, is essentially education for attitudes. It would develop in the child a social conscience in respect to the environment. Social conscience implies particular attitudes toward environment. The attitudes and values determined to be the most desirable outcomes of Natural Resources Education are respect for, identification with, and responsibility toward the total environment. "Respect" may be expressed by the attitude that all living things have the right to exist. It might also take the form of a cautious approach when dealing with natural forces. "Responsibility" may be expressed in individual or collective terms and would probably appear in both forms. For the individual it means management of the resources with which he comes in contact. Collectively, it means exercising the vote to maintain, preserve, and create resources.

As more people become producers of services or deal with resources secondarily, fewer have the opportunity for meaningful contact with the land. A feeling of alienation, or lack of purpose may be the result. People must be reunited, must "identify" with the natural environment if they are to recognize its inherent value.

It is proposed herein that if the child acquires particular broad environmental understandings (knowledge) he will develop a social conscience (attitudes) that will affect his behavior (actions) toward the total environment. Figure 1 illustrates the aims or goals of Natural Resources Education.

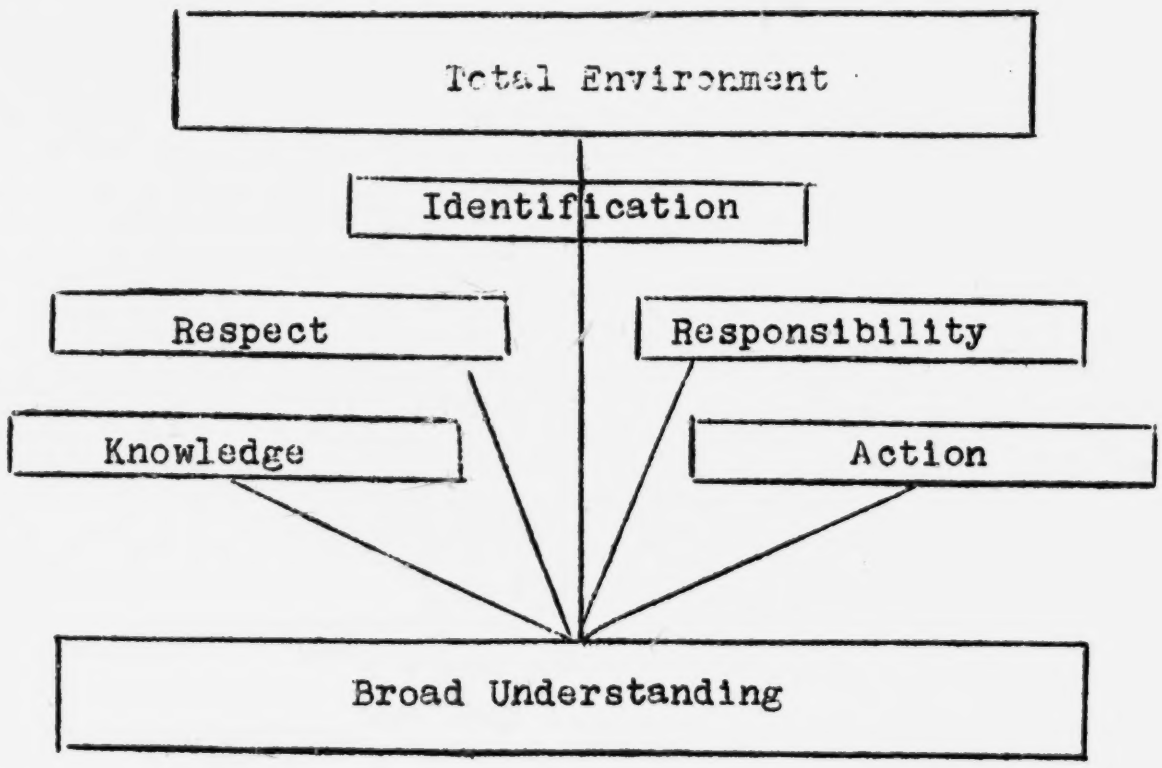

Figure 1. Aims of Natural Resources Education

Knowledge, respect, responsibility, identification and action are not the automatic result of exposing children to a particular curriculum structure. Communication or meaning flowing between the educational agent (e.g., teacher or community, through vicarious or direct experience) and the child is a critical factor in determining whether natural resources education takes place.

Significance of the study. There appears to be little doubt that the responsibility for developing informed and aroused citizens who will take an active role in local, state, national, and international resource issues lies with the schools. It is also true that, in addition to transmitting the cultural heritage, "schools have come increasingly to accept such purposes as (a) helping citizens to become more fully aware of the problems of society and (b) studying those problems with the view of improving the conditions for living, and ways of living."[2] This point

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[2]American Association of School Administrators, Conservation Education in American Schools (Washington, D.C.: American Association of School Administrators, 1951), p. 62.

of view undoubtedly led the 1948 Yearbook Committee of the Association for Supervision and Curriculum Development to state that:

> the school is obligated to make the facts of resources known; to make the possible choices and consequences clear; and to guide individuals to establish sets of values which will balance immediate gain against future need and private riches against social good.[3]

It is important, and may soon become critical, that Americans become apprised of resource problems and their remedies. It is even more important that they understand the requirements for quality environment. Man has accelerated environmental change to the extent that he has it in his power to take a course of action toward resources and populations which will force future human beings to live at a mere subsistence level, if they survive at all. The choice is his--"if each of us fails to help in building the kind of world that he wants to live in he may find too late that the 'brave new world' that someone else has

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[3]Association for Supervision and Curriculum Development of the National Education Association, Large Was Our Bounty: Natural Resources and the Schools (Washington, D.C.: Department for Supervision and Curriculum Development, National Education Association, 1948), p. 7.

created has no place in it for him."[4]

The demand for educational change to meet environmental change cannot be ignored; the charge for public education is clear. This study is an attempt to satisfy the need for new approaches.

Guiding principles. Basic assumptions and guiding principles for Natural Resources Education have emerged from the literature, from interactions with educators, and from training, experience, and contemplation on the part of the researcher. These are listed and discussed as follows:

1. The conceptual structure of Natural Resources Education must reflect this basic equation: MAN + NATURAL RESOURCES = SURVIVAL + DEVELOPMENT.[5] The foregoing formula can be appropriately adopted as a guiding principle for curriculum construction. It is a summation of all the broad understandings, and all of the concept areas that

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[4]Raymond F. Dasmann, Environmental Conservation (New York: John Wiley and Sons, Inc., 1964), pp. 2-3.

[5]Guy Prisco and Edward Duffy, Natural Resources Center Orgainizational Concepts, (Preliminary design for the Natural Resources Center, Aurora, Illinois, 1967).

form the basis of the conceptual structure of Natural Resources Education. It was derived from the "organizational concepts" that are part of the long-range plan for the Natural Resources Center for DeKalb County. It adds a new demension to this study and provides a new perspective on man and environment. See Figure 2.

2. Natural resources concepts are best acquired in the context of the whole environment and in relation to the whole curriculum. The developed curriculum may enter the experience of children directly or vicariously, indoors or outdoors, formally or informally. An environmental approach recognizes the importance of all environments in implementing resources education.

3. Concepts should constitute "recurrent themes". Like "threads" they should run through the curricula in a cumulative, over-arching fashion.[6] The integration of natural resources concepts should begin at the kindergarten level and proceed through developmental levels though grade six. Optimally it would continue through grade 12. Concepts should spiral through the curriculum, broadening and

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[6]Hilda Taba, Curriculum Development Theory and Practice (New York: Harcourt, Brace and World, Inc., 1962), pp. 296-301.

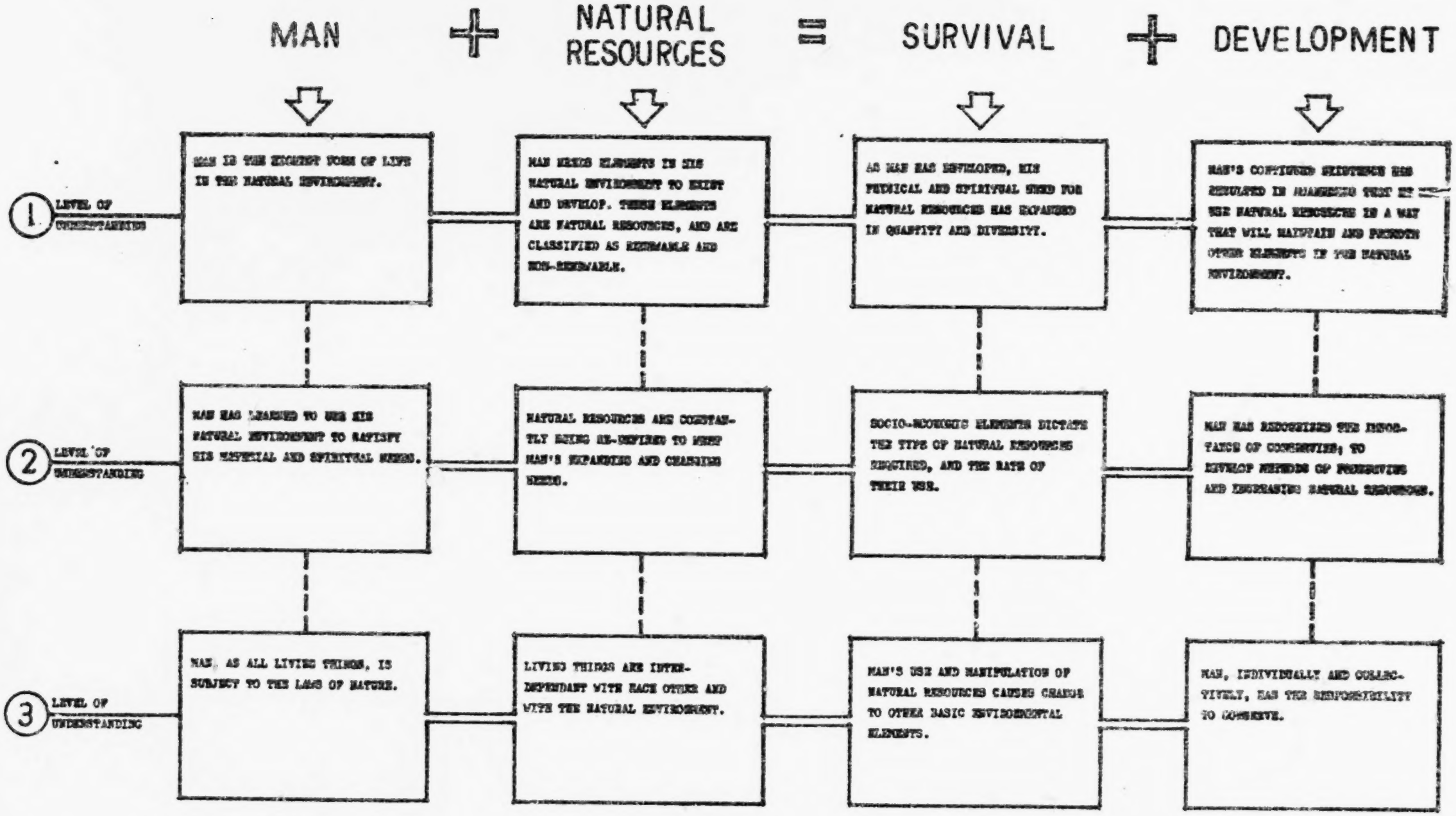
MAN
NATURAL RESOURCES
SURVIVAL
DEVELOPMENT
1 LEVEL OF UNDERSTANDING
MAN IS THE HIGHEST FORM OF LIFE IN THE NATURAL ENVIRONMENT.
MAN NEEDS ELEMENTS IN HIS NATURAL ENVIRONMENT TO EXIST AND DEVELOP. THESE ELEMENTS ARE NATURAL RESOURCES, AND ARE CLASSIFIED AS RENEWABLE AND NON-RENEWABLE.
AS MAN HAS DEVELOPED, HIS PHYSICAL AND SPIRITUAL NEED FOR NATURAL RESOURCES HAS EXPANDED IN QUANTITY AND DIVERSITY.
MAN'S CONTINUED EXISTENCE HAS RESULTED IN MANKIND THAT HE USE NATURAL RESOURCES IN A WAY THAT WILL MAINTAIN AND PROTECT OTHER ELEMENTS IN THE NATURAL ENVIRONMENT.
2 LEVEL OF UNDERSTANDING
MAN HAS LEARNED TO USE HIS NATURAL ENVIRONMENT TO SATISFY HIS MATERIAL AND SPIRITUAL NEEDS.
NATURAL RESOURCES ARE CONSTANTLY BEING RE-DEFINED TO MEET MAN'S EXPANDING AND CHANGING NEEDS.
SOCIO-ECONOMIC ELEMENTS DICTATE THE TYPE OF NATURAL RESOURCES REQUIRED, AND THE RATE OF THEIR USE.
MAN HAS RECOGNIZED THE IMPORTANCE OF CONSERVING; TO DEVELOP METHODS OF PRODUCING AND INCREASING NATURAL RESOURCES.
3 LEVEL OF UNDERSTANDING
MAN, AS ALL LIVING THINGS, IS SUBJECT TO THE LAWS OF NATURE.
LIVING THINGS ARE INTER-DEPENDANT WITH EACH OTHER AND WITH THE NATURAL ENVIRONMENT.
MAN'S USE AND MANIPULATION OF NATURAL RESOURCES CAUSES CHANGE TO OTHER BASIC ENVIRONMENTAL ELEMENTS.
MAN, INDIVIDUALLY AND COLLECTIVELY, HAS THE RESPONSIBILITY TO CONSERVE.

Figure 2. Natural Resources Center Organizational Concepts

increasing in sophistication in response to grade level changes in existing science and social studies curricula. Natural Resources Education hinges upon the contention that very young children are able to grasp intuitively complex concepts and structure.[7] The researcher believes that early awareness and understanding of environmental relationships can emerge from these intuitions.

4. Science and social studies are particularly relevant to natural resources education and are, therefore, appropriate avenues for integration. If integration means "teaching together what belongs together",[8] conservation and natural resources education are perhaps most properly interwoven with the whole curriculum. It is more practical, however, to select those areas that are most relevant to the study of natural resources or that approximate "environmental science". The subject area of environmental science does not generally exist in the public schools of the United States. The environmental sciences are

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[7]Jerome S. Bruner, The Process of Education (Cambridge, Mass.: Harvard University Press, 1963) p. 47.

[8]June E. Lewis and Irene C. Potter, The Teaching of Science in the Elementary School (Englewood Cliffs, N.J.: Prentice-Hall, 1961) p. 24.

fragmented and compartmentalized into the natural and physical sciences, social studies, history, geography, agriculture, economics, sociology, government, and civics. Science and social studies relate closely to the study of natural resources and, viewed as one area, constitute "environmental science", therefore, the researcher will plan the integration of natural resources concepts around and limit it to existing science and social studies curricula.

5. Natural resource concepts should be stated in terms specific enough to suggest teaching experiences on the part of the teacher. Concepts should be selected not only for their scientific or academic validity but for their utility and learnability. Selections should be made, therefore, with the teacher in mind.

Limitations. The scope of this study is limited to the construction of a conceptual framework for natural resources education and the establishment of a procedure for integrating the developed curriculum with existing courses of study. Analysis of curriculum materials was limited to those existing in the science and social studies curricula of the DeKalb County Schools. The pilot area was limited to grades one through six.

II. DEFINITIONS OF TERMS USED

It is desirable to define certain terms that will be found in the context of this study. The words or phrases are not highly technical, nor are they uncommon. They are characterized, however, by varied associations.

Conservation Terms

Conservation. Leopold's definition of conservation as being "a state of harmony between men and land" is most applicable to this study.[9] Other definitions accomodated by Natural Resources Education are:

1. Conservation is the wise use of natural resources.

2. "Conservation of natural resources (is) the use of natural resources to provide the highest quality of living for mankind. It must aim toward both a material and spiritual enrichment of life for man on earth, now and in the future."[10]

3. "Conservation of natural resources means the fullest possible use of them without abusing

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[9]Aldo Leopold, (source unknown) cited by American Association of School Administrators, Conservation Education in American Schools (Washington, D.C.: American Association of School Administrators, 1951) p. 6.

[10]Dasmann, op. cit., p. 7.

> the ones exploited, without destroying any needlessly, and without neglecting any that can be used."[11]

Natural resources. These are basic or primary materials or areas considered useful or of value to a particular human culture. Natural resources are in constant redefinition in response to patterns of use. Primitive cultures use resources in a manner different from that of a modern culture, e.g., early Illinois Indians used chert to fashion arrowheads; today the rock is crushed and used on modern highways. Natural resources are commonly categorized as renewable and nonrenewable.

Renewable resources. These are living or biotic resources and others closely associated with and affected by living organisms, i.e., plants, animals, soil and water.

Nonrenewable resources. These are non-living materials such as minerals and fuels. They are exhaustible or potentially impossible to recover.

Curriculum Terms

Curriculum design. This is an interpretation of

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[11] Ruben L. Parson, Conserving American Resources (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1956), p. 3.

curriculum that presents components and relationships in graphic form.

Broad understandings. These are broad generalizations about environment. They are the result, in the broadest sense, of cognitive processes.

Concept areas. Concept areas are topics around which cluster an undetermined number of concepts. They relate closely to the broad understandings.

Subconcept areas. These also are topics and associated concepts. Subconcept areas relate to specific concept areas and are subordinate in curriculum emphasis to these areas. They also relate directly to specific broad understandings.

Concepts. A concept is that level of knowledge which relates facts and basic ideas. Several or many concepts constitute a concept or subconcept area.

III. ORGANIZATION OF THE REMAINDER OF THE PAPER

Chapter II presents a review of the literature with particular emphasis on the documented need for new approaches to natural resources and conservation education. Chapter

III is, (1) an exploration of the broad understandings and natural resources concepts and the basis for their selection, (2) a description of the curriculum design, and (3) a resumé of the key adaptive integration procedure developed as an integral part of the study. Chapter IV includes a summary of the study, and findings and recommendations for further study.

CHAPTER II

REVIEW OF THE LITERATURE

A literature search was initiated for materials relevant to natural resources or environmental education. Particular emphasis was directed toward references indicating need for curriculum revision, recommendations for specific practices, and those offering a critique of current conservation education. A short review of some of the literature on methods for influencing attitudes is included. References cited are those that point up the importance of developing particular attitudes or values or that pursue the manner in which values are created.

I. LITERATURE ON CONSERVATION AND ENVIRONMENTAL EDUCATION

Literature citing need and recommendations for conservation education. According to Stapp, a comprehensive conservation program, spanning the curriculum (kindergarten through twelfth grade) is imperative if we expect to prepare citizens to make future resource

decisions.[1]

Barfield cites a need for an approach that will not only guarantee the dissemination of accurate information but will instill desirable attitudes and understandings of conservation as well.[2]

Train will settle for no less than a revolution in our educational system. He rejects a system built on knowledge of facts with which man may operate on his world. He would like the student to see himself as part of an interdependent, interrelating world, not simply as its manipulator.[3]

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[1]William B. Stapp, Integrating Conservation and Outdoor Education into the Curriculum (K-12) (Minneapolis, Minn.: Burgess Publishing Co., 1965), p. 2.

[2]Arthur D. Barfield, "A New Look at Conservation Education" Science News IX No. 2 (Winter, 1963), .

[3]Russell E. Train, America the Beautiful, An Address Presented Before the 90th Annual Meeting of the American Forestry Association (Washington, D.C.: The Conservation Foundation, 1965).

Brandwein cites a need for a "sanative environment".[4] The "healing" environment which he describes is one in which each child's intellectual tools are developed to their fullest and in which fulfillment is given to all children. Such an environment would permit and encourage the development of those traits that have evolutionary value for the human species. It would encourage the development of conservators, for in conservation are found evolutionary cadres. He discusses a "kind of education relevant in this moment of history when comprehension of the fitness of the environment and the interdependence of environments or organisms, and of men is essential to securing sanative environments and sane men."[5] A primary aspect of securing a sanative environment for the child is "educational structure" found in curriculum of schools. He proposes a structure of meanings that is "an environment of mental constructs (concepts) in which the teacher finds

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[4]Paul F. Brandwein, "Origins of Public Policy and Practice in Conservation: Early Education and the Conservation of Sanative Environments", Future Environments of North America, ed. F. Fraser Darling and John P. Milton, (Garden City, New York: The Natural History Press. 1966), pp. 628-47.

[5] Ibid.

direction and scope. and the child finds psychological safety and freedom to experience, but these experiences are in search of meaning."[6]

In 1937 the U. S. Office of Education called the first national conference on conservation education. As a result of that conference, the Office published a bulletin entitled,"Conservation in the Education Program". It suggested seven guiding principles to be followed when introducing the study of resources and their use into the school program. Thirty years later they are still timely.

> 1. Conservation cannot be adequately taught thru (sic) a single unit or a series of single units in this field. While for purposes of emphasis it may be desirable to develop such units, it is only as the concepts of conservation are made a fundamental part of curriculum planning that the subject can be adequately treated.
>
> 2. The materials of conservation education lend themselves effectively to curriculum planning. Conservation forms one of the major themes which may appropriately be considered in curriculum construction.
>
> 3. The materials available in the field of conservation from both private and governmental sources provide basic material to be developed and organized for instructional purposes.

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[6]Brandwein, op. cit., p. 630.

4. In developing a program of conservation education it is important to consider the various aspects of conservation, but such consideration should by no means narrow the view of this subject for the pupils. It is important that the whole program be approached in the large.

5. Conservation education cannot appropriately be confined to any one subject or field. Its understanding and appreciation come best through a knowledge of materials in several fields including economics, science, civics, agriculture, home economics, and geography.

6. The primary concepts of conservation can be understood and appreciated in their elementary form by very young children.

7. In developing a curriculum in conservation education its larger concepts should be dominant and such aspects as the study of wild flowers, the protection of game, the proper utilization of mineral resources should be presented as elements in the development of a complete program.[7]

More recently the American Association of School Administrators gave evidence of the importance they attach to conservation education. Their 1951 Yearbook offered 12 guides to educational programs for improving conservation.

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[7]W. H. Bristow and Katherine M. Cook, Conservation in the Education Program, Department of Interior, U. S. Office of Education, Federal Security Agency, Bulletin No. 4 (Washington, D.C., 1937), p. 8., cited by Association for Supervision and Curriculum Development of the National Education Association, Large Was Our Bounty: Natural Resources and the Schools (Washington, D.C.: Department for Supervision and Curriculum Development, National Education Association, 1948) p. 128.

1. Education for the Wise Use of Natural Resources Should Be Included in Both Urban and Rural School Programs

2. Education for Conservation Should Be Included in Both Elementary and Secondary Schools

3. Conservation Education Programs Should Start with a Consideration of Community Environment and Needs, Then Evolve into a Consideration of State, Regional National, and International Aspects

4. Appropriate Conservation Knowledge and Experience Should Be Correlated with or Integrated into the Prevailing Curriculum

5. The Best Existing Textbooks, Pamphlets, Films, Recordings, and Other Instructional Aids Should Be Utilized, but an Attempt Should Also Be Made To Develop Materials That Are Adapted to the Community's Own Environment and Resources

6. Conservation Education Lends Itself Well to Direct Outdoor Experience; and Wherever Practicable, Such Experience Should Accompany the Vicarious Classroom Experience

7. Schools Should Cooperate with Community, State, Regional, and National Agencies, Governmental and Nongovernmental, Which Are Concerned with Resource Use

8. Conservation Education Should Be of Special Concern to Teachers Colleges and Universities Involved in Teacher Education

9. Effective Administrative Leadership Is Needed in All Communities, States, and Regions, Including the Inservice Education of School Personnel in the Wise Use of Natural Resources

10. Conservation Education Should Be the Concern of All Types of Adult Education Agencies, Such as State Departments of Education, Departments of Conservation, Adult Schools, Colleges, Universities, Newspapers, Magazines, Motion Pictures, and Radio and Television Stations

11. Conservation Education Programs Should Be Concerned with All Natural Resources and Their Relationships.

12. Conservation Education Should Be Based upon Broad Scientific and Social Concepts[8]

Integration, as a concept of organization for conservation education, is widely recommended. The successful implementation of integrative programs, however, presents a continuing curriculum problem. Taba attests to the difficulties involved in unifying learning when she says, "by far the greatest number of experimental curriculum schemes have revolved around the problem of unifying learning. At the same time we are far from achieving unification, partly because of fear of loss of disciplined learning if the study of specialized subjects is discarded, and partly because as yet no effective basis has been found for unifying school subjects."[9]

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[8]American Association of School Administrators, Conservation Education in American Schools (Washington, D.C.: American Association of School Administrators, 1951), pp. 63-71.

[9]Hilda Taba, Curriculum Development Theory and Practice (New York: Harcourt, Brace and World, Inc., 1962), p. 298.

The Ann Arbor, Michigan, schools are operating an integrative program for conservation and outdoor education. The plan devised by Stapp is tailored to the curriculum of the Ann Arbor schools, but it may be adapted to the needs of other school systems. His approach recognizes socio-economic as well as bioeconomic understandings as being important in conservation education.

Summary of literature citing need and recommendation for conservation education practices. New approaches, as outlined by the literature would offer conservation education to the youngest and to the oldest school child; they would instill attitudes as well as impart information; and they would present man as a part of his environment. Brandwein offers a conceptual organization that is undeniably a new approach to science curricula. In the opinion of the researcher Brandwein's conceptual schemes are exemplary. He provides scope and sequence through a spiral organization of concepts and his orientation is environmental. He works, however, within the boundaries of the traditional school subject areas. Although his structure is limited to the elementary science curriculum in the reference cited, he suggests that similar conceptual schemes be developed for the social sciences and the

humanities. Brandwein's approach requires the introduction of new structure (conceptual schemes) to the school's curriculum. It would appear that schools may adopt his conceptual schemes, available in the Harcourt, Brace and World Science series,[10] or they may adapt his schemes to their existing materials.

The seven principles and the 12 guides offered by the U.S. Office of Education and by the American Association of School Administrators are alike in several respects. Both emphasize broad concepts as a basis for conservation education, and both recommend integration as a principle of organization. Stapp's plan, integrates conservation education with existing science and social studies curricula in the Ann Arbor, Michigan school system.[11] Brandwein integrates the physical and biolgical sciences in his conceptual schemes for science. Evaluation of such programs should provide guidance for the implementation of new plans utilizing an integrative approach.

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[10] Paul F. Brandwein, et. al., Concepts in Science (Teacher's Edition) (New York: Harcourt, Brace and World, Inc., 1966), pp. T8-9.

[11] Stapp, op. cit. p. 93.

Literature offering a critique of current conservation education practices. Dissatisfaction with old curriculum structure and old methods of teaching conservation is apparent. Brennan of the Pinchot Institute of Conservation Studies attests to the dismal picture of conservation education in the United States. He states that "conservation education has generally failed."[12] He indicates that of 50 papers received for a recent major conference on conservation education, the one single element of unanimity was a recognition of the need for environmental science studies in the schools of the nation. He states, "present curriculums do not provide our people with any understanding of how man controls, transforms, uses wisely, preserves, or destroys his world, or how he is dependent on it. We [of the Pinchot Institute] believe they should."[13]

Under the auspices of the Education Division of the Conservation Foundation, Munzer launched a research study to determine, (1) what conservation is being taught,

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[12] Matthew J. Brennan, The Pinchot Institute, U. S. Department of Agriculture Forest Service (Washington, D.C.: Government Printing Office, 1965).

[13] Ibid.

(2) how it is being taught, (3) how well it is being taught, and (4) how it can be taught more effectively."[14] Munzer's curriculum analysis revealed the following categories commonly listed in the materials reviewed in the course of her study:

Renewable Resources
  Soil
  Water
  Forests
  Wildlife
Nonrenewable Resources
  Minerals
  Fuels
Human Resources
  Health and Safety
  Welfare and Education
  Vocational Guidance
  Gifted
  Recreation
  Community Resources
  Planning

In the area of human resources, Munzer reports a decided lack of agreement as to what should be taught. Although conservation appears to fall most generally into the accepted concepts of science and social attitudes, it appears twice as often in science as in social studies curriculum. She found that there was considerable overlapping and spilling over into other curriculum areas,

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[14] Martha E. Munzer, "What Do Our Schools Mean By Conservation Education", Science Education, 43:312-18, October, 1959.

which "might imply that curriculum planners believe that conservation should pervade the entire curriculum."[15] The apparent indecision about what to teach and in which area may warrant Munzer's observation that "conservation education being everybody's business, may turn out to be nobody's".[16]

Brandwein believes that educational practices have not prepared young people for life in a changing environment, an environment in which science and technology have increasing impact. He describes current conservation education practices as having no intellectual vigor, being irrelevant to the needs of urban children, and being supererogatory to rural children. He states that conservation education is often just a title for the occasional walk in the woods or for the trivial naming of specimens.[17]

Summary of literature offering a critique of current conservation education practices. Experience in the area of conservation education has led the investigator to agree with the foregoing criticisms of current

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[15]Munzer, op. cit., p. 313.

[6]Ibid.

[17]Brandwein, op. cit., pp. 629-30.

educational practices. Programs are oriented more to the needs of rural children than to urban children. Approaches are perhaps more biological or agricultural rather than environmental. Although educators agree that conservation should pervade the curriculum, there is a great deal of confusion regarding the nature of conservation content and the areas of integration. As a consequence, conservation education has gained the reputation of a "second class" subject. It occupies a position in the curriculum similar to that of vocational education. Students with low ability are often steered into conservation classes. This coupled with content that offers no challenge and little relevance to life in an increasingly urban society, discourages students with high ability.

Munzer indicates that conservation education appears less frequently in social studies curricula than in science curricula. As conservation becomes more man-environment oriented, this will probably change. Recent emphasis on the study of ecology in the biological sciences may lead conservation education away from a preoccupation with resources per se and toward a consideration of man's fitness to the whole environment--socioeconomic as well as bioeconomic.

II. LITERATURE ON ATTITUDES EDUCATION

There is ample support for the contention that resource education is essentially "attitude education". According to Strasser, in an article concerned with thinking and feeling, "we must deliberately focus attention upon the development of a value system which places a high priority upon behavior that reflects decisions and actions consistent with the concept of wise use of our natural environment."[18]

Combs is convinced that the key to effective behavioral change is an individual's personal discovery of meaning. He believes that values are more than intellectual or abstract ideas, being rather, deep and consistent convictions which affect actions.[19]

It is generally agreed that attitudes and values should be and are transmitted in a formal learning situation. At least two researchers indicate how it is done. Strasser states that "for values to be developed in the classroom,

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[18] B.B. Strasser, "One Step Further, Affecting and Reflecting", Childhood Education, 40:410, April, 1964.

[19] Association for Supervision and Curriculum Development, National Education Association, Perceiving Behaving Becoming (Washington, D.C.: Association for Supervision and Curriculum Development, 1962), p. 199.

they must be lived. Children need opportunities to make decisions; to look at possible outcomes; and to consider alternatives in terms of what is good for the individual, for the group, and for the natural environment. We as their teachers, "must ask intelligent questions for which only they have the answers."[20]

According to Taba, "Feelings, values, and sensitivities are matters that need to be discovered rather than taught."[21] She states, with regard to the schools' efforts in this direction, "the teaching of values is largely of three types: teaching about them, moralizing, and hoping that they will emerge as a by-product of other things in the program.

It is no wonder, then, that school programs have less of an effect on the development of values than might be expected, and offer meager experiences for the internalization of important values."[22]

Summary. It is appropriate to ask whether values can be created or modified in a formal learning situation.

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[20] Strasser, op. cit.

[21] Taba, op. cit., p. 224.

[22] Taba, op. cit., pp. 223-24.

The feasibility of a conceptual structure depends on whether the attitudes and values that are primary objectives are attainable. Attitudes cannot be transmitted directly. That is to say, they are arrived at as a result of a series of mental processes, after cognitive organization and assimilation, and most importantly, acceptance of ideas. Strasser's and Taba's ideas may point direction for formulating methods and techniques for influencing attitudes and values. They are saying, in essence, children should "practice" making value judgments so that they may "discover" how they feel. The teachers role may be that of providing opportunities for making value judgments and being "accepting" of opinions and feelings emerging from these experiences.

CHAPTER III

THE CURRICULUM

Curriculum development proceeded three ways: (1) the formulation of basic structure for Natural Resources Education, (2) the design of the curriculum, and (3) the establishment of a key adaptive procedure for integrating Natural Resources Education with existing curricula.

I. BASIC STRUCTURE FOR NATURAL RESOURCES EDUCATION

Twelve "broad understandings" were formulated to establish the basic framework of Natural Resources Education. These reveal the basic structure of environmental conservation. The broad understandings were derived from a variety of sources. They reflect wide reading, experience in conservation education, reflection, and synthesis on the part of the researcher. They are considered one by one:

1. Natural resources are everything man uses. They are in constant redefinition. This first understanding is in answer to the question, What are natural resources? The answer a decade ago would have been immediately forthcoming, and it would have included the following: plants (or forests), animals (or wildlife), soil, water, and

minerals. The answer today bears contemplation.

To the foregoing list one must add the sun, atomic energy, the seas, the air, and even those that as yet are undiscovered. How can natural resources be defined for children to reflect the movement and change within the concept? How can man and resources be placed in proper perspective? How can we direct the attention of children to the whole environment as a resource and not, all too exclusively, to its parts? Broad understanding #1 emphasizing use and change, appears to be most relevant to this problem.

2. Man is dependent on the renewable resources for his survival. Primitive peoples have long recognized their basic dependence on plants, animals, soil, and water. Even the pioneer looked at his bread and saw the soil. Twentieth century man looks at his bread and sees the supermarket. He does not make contact with the resource base. Children in a modern society need to become acquainted with realities that their primitive counterparts knew so intimately. Survival is still a reality and one that may be jeopardized by man's inability or refusal to adhere to its requirements.

3. Our industrial civilization depends on the nonrenewable resources--the metals and the fossil fuels. People in the United States enjoy the highest material standard of living in the world. Man in general has advanced beyond the subsistence or survival level, and in many cases has become prosperous. This is due to the fact that he has a remarkable intelligence, permitting him to develop resources through his technology to the present high level. The resource base responsible for a prosperous industrial society is, unfortunately, exhaustible--at least within the calculable future. "Without the basic mineral resources we could have no machines and factories; no modern means of transportation such as cars, trains, steamships and planes; no instruments of communication, such as the telephone, radio and television; and no household conveniences, such as refrigerators, vacuum cleaners or the many other products which have made our material standard of living so far superior to that of other countries."[1]

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[1]William H. Stead, Natural Resource Use in Our Economy, Joint Council on Economic Education (New York: Conservation and Resource-Use Project, Joint Council on Economic Education, 1960), p. 24.

The full impact of this understanding is not felt, however, for many Americans are "science-will-come-up-with-a-substitute" people, who serenely look to the laboratory for the answer to all our resource problems.[2]

The next generation, those who will formulate future public practice and policy, must understand the relationships between resources and the economy, the limitations of science, and they must be aware of possible solutions to the problem of finite resources.

4. Living things are interdependent with each other and with the physical environment. This understanding can be stated thus: "Natural resources must be thought of as having an essential unity rather than as separate categories. They are interrelated and interdependent. This unity, the closely linked interdependence of soil, water, minerals, plants, animals, and man, constitutes the seamless web of life and matter."[3]

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[2]Matthew J. Brennan, The Pinchot Institute (Washington, D.C.: U. S. Department of Agriculture Forest Service, 1965).

[3]American Association of School Administrators, Conservation Education in American Schools (Washington, D.C.: American Association of School Administrators, 1951), p. 72.

If citizens understand interrelationship and interdependency they are better able to plan and to insure quality environment for themselves and for their children. The Conservation Foundation, in their publication, "Concepts of Conservation", makes a plea for better planning. It states:

> In our society development tends to outrun planning. Too often the bulldozer and wrecker have done their work before the conservationist and planner arrive on the scene....At present, there aren't enough trained planners to meet the needs of all the communities interested in building for the future and there are certainly not enough planners, architects and engineers and others responsible for future land use, who are trained in the field of ecology. This is the science that deals with the interrelationships of living things with each other and with their environment. We may cause, and indeed have already caused, irreparable damage, by failing to take these relationships into account. An ecological background is an essential part of the planning process.[4]

5. Man as all other living things, is subject to the laws of nature. Early religious training has assured man that "he was created in the image of God". A literal interpretation of this may account for the tendency of students to categorize the living world as plants, animals, and man. Wherever the source, it becomes increasingly

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[4]The Conservation Foundation, Concepts of Conservation (Washington, D.C.: The Conservation Foundation, 1963), p. 56.

dangerous for man to divorce himself from the web of life, or to look upon the world as his estate upon which he may operate at will. Nature is neutral but if her balance is upset, she is unrelenting in her wrath. On every hand can be seen evidence of man's mistakes of the past eroding the prosperity of the present. To disturb the balance of nature without calculating the consequences is to invite disaster.

"Despite his present position of dominance on earth, man is still dependent upon other living things for his sustenance. Locked up in cities, civilized man may assume that he has risen above nature, but the bread he eats comes from wheat plants formed of soil and sunlight."[5]

6. Change is a fact of the environment. It is dynamic and inevitable. Change takes place in life, matter, and energy. The fact that man is able to accelerate environmental change adds a new dimension and new implications for its study. Change initiated and accelerated by man often means an acceleration in the rate of environmental deterioration. Can man control change? Can he make

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[5]Raymond F. Dasmann, Environmental Conservation (New York: John Wiley & Sons, Inc., 1964), pp. 7-8.

it continue to work for him or will it consume him? The task of maintaining, preserving and creating environmental quality is the heritage of the next generation. Future scientists, economists, historians, conservationists, and politicians are presently in the schools of the nation. The task must be made clear if they are to be equal to the challenge. A thorough understanding of change may help.

7. The pressures of population and urbanization accelerate and increase resource use. Brennan defines the new problems of land and man. He calls them the "P" problems--people, population, pesticides, pollution, and poverty of the environment.[6] Udall emphasizes the problem of population when he asks,

> What is the ideal 'ecology of man', the ideal relationship of the human population to environment? Is man subject to the laws of nature, which hold that every species in any environment has an optimum population? How much living space do human beings need in order to function with maximum efficiency and to enjoy maximum happiness? It is obvious that the best qualities of man must atrophy in a standing-room-only environment. Therefore, if the fulfillment of the individual is our ultimate goal, we must soon determine the proper man-land ration for our continent.[7]

These words have real significance for educators. An

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[6]Brennan, op. cit.

[7]Stewart L. Udall, The Quiet Crisis (Washington, D.C.: Holt, Rinehart and Winston, Inc., 1963), p. 198.

important educational goal is undeniably fulfillment of the individual. It would appear that the success of educational efforts in this direction may depend, at least in part, on a proper balance of men and land.

Cities in the United States "have grown too fast to grow well".[8] In many cases they have ignored and neglected the human requirements that permit the best in man to prosper. These are the problems of the 1960's. They are part of the "quiet crisis" about which Secretary Udall writes. In a world accustomed to crises, the conservation educator's task is indeed a difficult one. A thorough understanding of the problems of population and urbanization on the part of students will help make that task rewarding.

8. The amount and rate of resource use is determined by the economy. Stead, under the auspices of the Joint Council on Economic Education, has produced a list of generalizations and classroom learning activities for the use of natural resources in the economy. Broad understanding #8 was derived from one of his statements regarding management of resources for present needs. "In our

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[8]Udall, op. cit., p. 171.

economy we generally depend upon the 'marketing system' to regulate our production and use of resources in ways that will most nearly satisfy the needs and wants of people".[9] This understanding does not point out "what should be" but indicates the status of resources in the economy. Included would be answers to questions such as "Who discovers resources?" "Who renders the raw resources useful?" "How do resources get from the producer to the consumer?" Emphasis is upon the discovery, development, processing, marketing, distribution, and consumption of resources.

9. Environmental quality cannot always be easily defined in economic terms. In response to the question, "Is it good?", too many Americans counter with, "How much did it cost?" Implied is that "value" and the monetary system are not to be divorced. Udall rejects the notion that the "Gross National Product should be the chief index to the state of the nation, or that automobile sales or figures on consumer consumption reveal anything significant about the authontic act of living."[10] Americans tend to take for granted the exhilaration they feel in a brisk walk

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[9]Stead, op. cit., p. 73.

[10]Udall, loc. cit., p. 202.

in the woods or the peace that can be known in a tranquil hour on the bank of a beautiful stream. The "asphalt" American has often mistaken material ease and comfort for the good life. He does not recognize "value" in the form of a lush wilderness or in the intuitive response of a child to the living world. Perhaps his mechanized response to a mechanized world has blunted his appreciation of the higher values.

Recognition and encouragement of intrinsic values as they emerge in the child is the proper function of the schools. Unfortunately, attitudes and values are likely to slip away unnoticed unless the teacher is aware of the kinds of behavior that provide evidence of their existence.

10. Man has learned to use his environment wisely in a number of ways. In this understanding may be found the conservation curriculum of the past. Conservation education has all too often consisted of the study of specific conservation practices in respect to particular resources. There is a place for the consideration of methods and techniques of conservi[illegible] but it must be made relevant to students in the context of the environment in which they are living. Urban and rural environments must be brought into perspective, and ways and means of conserving the total

environment must be scrutinized.

An exploration of man's "use" of man is appropriate to this understanding. Human resources are managed and mismanaged as are other "natural" resources. The principles of human ecology are appropriate for study in the schools, indeed, they may have evolutionary value for future generations.

11. Government is active in the discovery, development, management, and protection of resources. One of Stead's generalizations on resource use in the economy states that "Federal and state governments have direct responsibility for managing publicly owned resources and specify the terms and conditions under which private individuals may develop them."[11]

A society that equates government with "the people", cannot afford to permit citizens to remain ignorant or apathetic in thier role as determinors of environmental deterioration or environmental quality. Children preparing for their adult role in determining public practice and policy, must understand their future collective responsibility and potential power to insure that public good is not sacrificed for private gain.

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[11] Stead, op. cit., p. 80.

12. Everyone has the responsibility for conserving the resources around him. National campaigns have been launched to apprise citizens of their individual responsibility to conserve and yet the environment, particularly in the cities, continues to deteriorate at an alarming rate.

The litter problem is a national disgrace. Litter removal from America's forests, parks, beaches, waterways, and other public areas costs taxpayers an estimated $500 million annually. "The basic reason for persistence of the problem is individual thoughtlessness. Many people feel no personal responsibility for the appearance of streets, highways, or the countryside, and carelessly leave a trail of trash behind them, wherever they go."[12]

Defining individual responsibility, by students as well as teachers, is a step toward creating a social conscience with respect to the environment. A fully developed social conscience would compel the citizen to assume responsibility for his own behavior toward his surroundings.

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[12]Keep America Beautiful, Inc., Fact Sheet (New York: Keep America Beautiful, Inc., 1966).

II. DESIGN OF THE CURRICULUM

The following criteria were developed to guide procedure for establishing a curriculum design for Natural Resources Education. The completed design must (1) indicate clearly the interrelatedness of all of the broad understandings, (2) establish a subordinate relationship between particular understandings, (3) illustrate the spiral organization of natural resources concepts, and (4) emphasize that concepts are not confined to any one developmental level.

Concept areas and subconcept areas. Each of the 12 broad understandings discussed in the preceding section of this chapter incorporates principles, generalizations, concepts, basic ideas, and facts. A broad understanding also serves as a focal point around which cluster an undetermined number of concepts. Eight of the 12 broad understandings (Numbers 1, 4, 6, 7, 8, 9, 10, 12) were selected to represent the basic framework for the curriculum and are hereafter referred to as "concept areas". The remaining four are subordinate to three of the foregoing eight understandings and are called "subconcept areas". This relationship is expressed as follows:

Understanding #2 is subordinate to Understanding #1

Understanding #3 is subordinate to Understanding #1

Understanding #5 is subordinate to Understanding #4

Understanding #11 is subordinate to Understanding #12

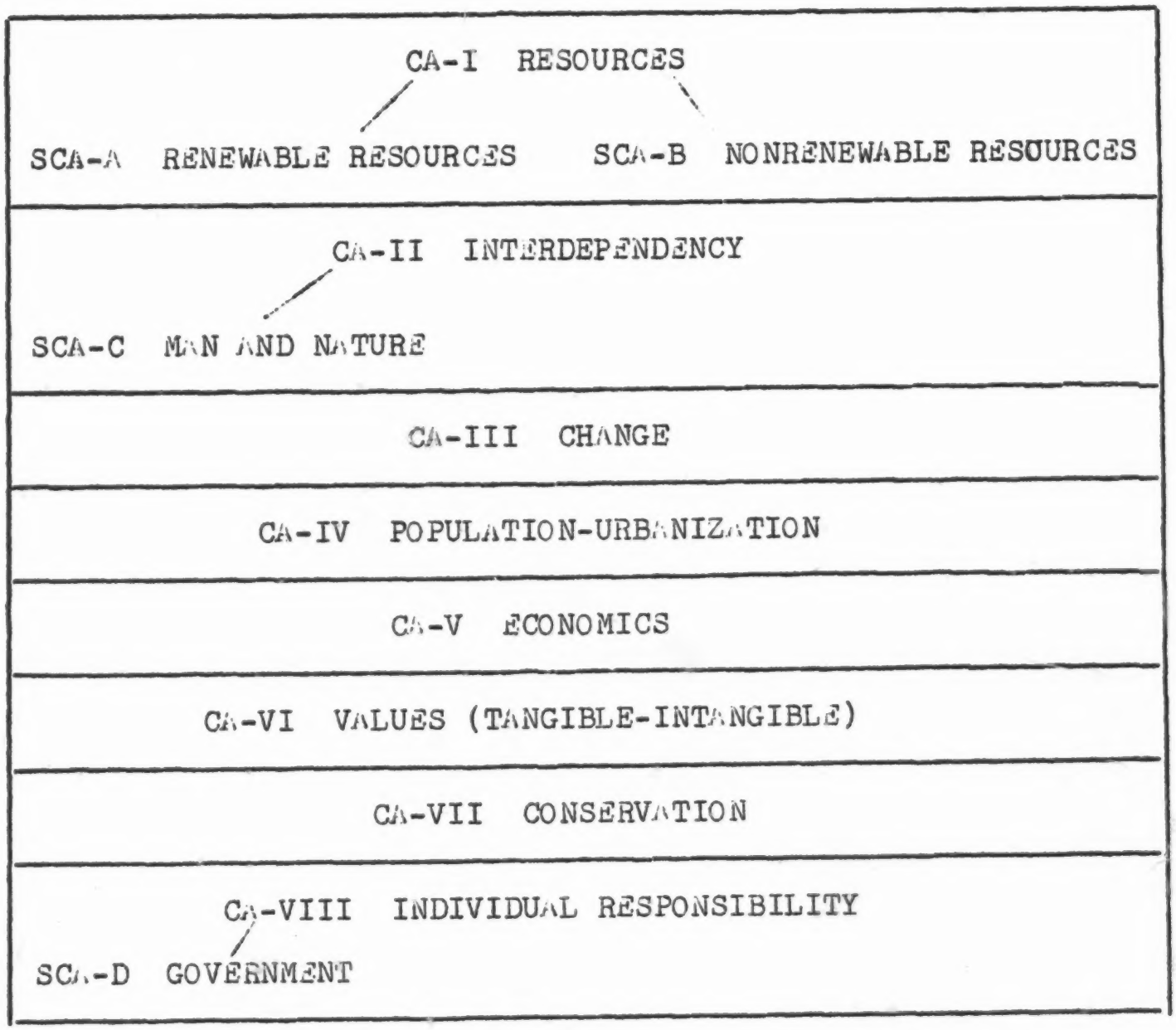
Concept and subconcepts are designated by the abbreviations CA and SCA respectively and are identified by Roman numerals, and letters, e.g., CA-I, SCA-A.

Figure 3 lists the concept areas and establishes the subordinate relationship to the subconcept areas. Figure 4 establishes the relationship of concept areas and subconcept areas to broad understandings and concepts.

Concepts. Each grade level was assigned 10 concepts. This number was estimated as reasonable both from the standpoint of learning and instruction. The 10 concepts were distributed over the previously established concept and subconcept areas as follows:

Concept Area	Number of Concepts
I	3
II	3
III	
IV	
V	2
VI	
VII	

Figure 3. Concept and Subconcept Areas and Their Relationships



CA - Concept Area

SCA- Subconcept Area

FIGURE 4. RELATIONSHIP OF CONCEPT AREAS AND SUBCONCEPT AREAS TO BROAD UNDERSTANDINGS AND CONCEPTS

	Broad Understandings	Concepts
CONCEPT AREA I: RESOURCES	1. Natural resources are everything man uses. They are in constant redefinition.	Primary(K-2): Conservation is using things we need so that all can keep on using them. Intermediate (3-4): Conservation is using natural resources in ways that will provide for future use. Upper Elementary (5-6): Conservation is that use of natural resources which seems to insure their adequacy for meeting the several basic needs of man throughout time.
Subconcept Area A; RENEWABLE RESOURCES	2. Man is dependent on the renewable resources for his survival.	Primary (K-2): If we are careful, we will always have all the (soil, water, plants, or animals) we need. Intermediate (3-4): Soil, water, plants, and animals are renewable resources. Upper Elementary (5-6): Conservation is using renewable resources in order to keep them productive so man can continue using them for all time.
Subconcept Area B: NONRENEWABLE RESOURCES	3. Our industrial civilization depends on the nonrenewable resources --the metals and the fossil fuels.	Primary (K-2): No matter how careful we are, someday we will use up all of some important minerals. Intermediate (3-4): Minerals are nonrenewable resources, or Nature renews them so slowly that they do not become available for man's use. Upper Elementary (5-6): Conservation is using specific nonrenewable resources efficiently and prudently and with a constant consideration for the development of adequate substitutes.

*Concepts are specified for primary, intermediate and upper elementary grade levels.

The number of concepts assigned to subconcept areas varies in response to an anlysis of existing science and social studies curricula.

The number of concepts selected for each concept area (or areas) reflects a curriculum emphasis on the use and redefinition of resources and the categories of resources; interdependency within the biological and physical environment and between man and environment; and individual and collective responsibility toward resources.

The design. The design emerging from organization of concept and subconcept areas satisfies all of the structural requirements for the presentation of Natural Resources Education. The Curriculum design (Figure 5) shows the interrelationship and the hierarchy of concept and subconcept areas. The concepts are shown spiralling through five levels. Grades kindergarten, first and second correspond to level one (primary); third and fourth grades are designated as level two (intermediate); fifth and sixth grades are level three (upper elementary). The remaining two levels (junior high and high school) are shown on the design but were not involved in the pilot area. Lines of demarkation between levels are indistinct to

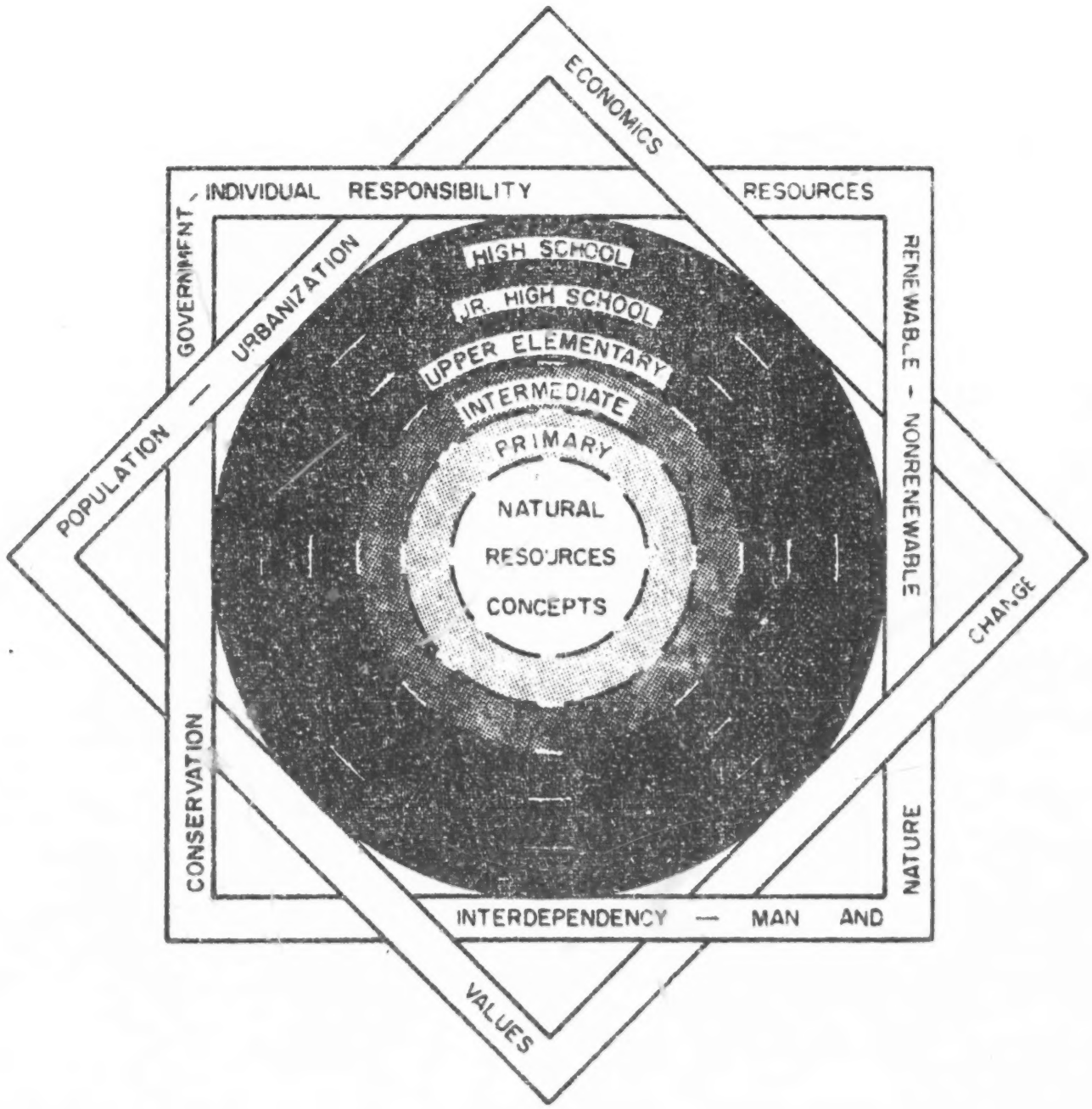


Figure 5. Curriculum Design

for Natural Resources Education

emphasize that concepts are not confined to any one developmental level.

III. INTEGRATIVE PROCEDURE

Step I. Analysis of science and social studies curricula in the DeKalb County schools indicated that a close correlation could be effected between the broad understandings and concepts of Natural Resources Education and relevant content of the existing program. Opportunities to integrate concept areas of the curriculum design appeared often, in some cases, at every grade level. Analysis entailed a review of the courses of study consisting of basal texts, multi-texts, resource units, and any combination thereof. Unit number, unit title, page numbers, and scope in textbooks were recorded on Form I. Unit title and scope were recorded in the case of resource units. Figure 6, page 53, is a sample of Form I. (DeKalb, Waterman, Esmond, Sandwich, Genoa-Kingston Schools).

Step II. Form I was used as a work sheet in Step II. The column entitled "comments" provided an opportunity to make notes correlating concept and subconcept areas and relevant content to textbook material and resource units. Opportunities for integration were identified in this manner. See Figure 6.

"EXPLORING THE OLD WORLD"
Follett Publishing Co.

Grade 6

Unit	Title	Pages	Scope	Comments
10	Germany and Four Neighbors	213-238	Switzerland--mountaing, farming, lumbering, grazing, manufacturing, small articles, dairying; Austria--forests and mountains, farming, abundant rainfall, warm summers, iron, little coal; Germany--farming, grazing, fine inland waterway system, westerly winds, moderate temperatures; Belgium and the Netherlands--farming, manufacturing, recovering land from the sea, dense population.	Man and nature (environmental limits) SCA-C Interrelationship CA-II Conservation CA-VII Population CA-IV
11	The British Isles	239-264	Industrial Revolution, manufacturing, location, mild climate, abundant rainfall, coal, iron, fishing.	Exhaustible resources SCA-B
12	Scandinavia and Finland	265-279	Denmark--food processing, pigs, cows, chickens; Norway--mountainous, water power, fishing, forest products, poor farmland; Sweden--iron, manufacturing, forest products, good farms; Finland--forest products.	Supply & demand CA-V

Figure 6. Sample of Form I

Step III. Correlations of relevant content with concept and subconcept areas were recorded on Form II, Figure 7, page 55 (DeKalb Schools). Content sources (science, social studies, and resource units) were distinguished one from another by the letters X (science), O (social studies), and R (resource units). Strong integrative emphasis was indicated by an asterisk (*). Form II makes visible all of the opportunities for integration existing in each of the eight concept and four subconcept areas. A selection could then be made for each level to provide for scope, sequence and continuity in the conceptual organization.

Step IV. Selection of concept and subconcept areas was made for each grade level and the number of concepts recorded on Form III, Figure 8, page 56 (DeKalb Schools). The number of concepts assigned to each concept area was determined according to (1) amount of emphasis the areas received in existing curricula, (2) distribution of relevant content over the elementary curricula, and (3) degree of social importance attached to any particular concept or subconcept area.

Step V. Ten concepts were selected for each grade level to correlate with relevant existing science and social

Grade	CA-I			CA-II		CA-III	CA-IV	CA-V	CA-VI	CA-VII	CA-VIII	
	CA-I	SCA-A	SCA-B	CA-II	SCA-C	CA-III	CA-IV	CA-V	CA-VI	CA-VII	CA-VIII	SCA-D
1		O X			X	R X			R		O	
2	R	R X		R		X		O			O	
3	O	R O X			O	R X		O*				
4		X	O* X*		O*	R* X*	O				O	
5		O X			O*	R* X	O*	O X*			O X	
6	O	X*	O X	R	X	X*	O	X		O		

R--Resource Units
X--Science Textbooks
O--Social Studies Textbooks
*--Strong Integrative Emphasis

Figure 7. Sample of Form II

Grade	CA-I			CA-II		CA-III	CA-IV	CA-V	CA-VI	CA-VII	CA-VIII		Total Concepts
	CA-I	SCA-A	SCA-B	CA-II	SCA-C	CA-III	CA-IV	CA-V	CA-VI	CA-VII	CA-VIII	SCA-D	
1	1	2		1	2	1			1		2		10
2	1	2		2	1	1		1			2		10
3	1	2		1	2	1		1			1	1	10
4		1	2	1	2	1	1				2		10
5		3		1	2		1	1			2		10
6		2	1	2	1					2		2	10

Figure 8. Sample of Form II.

studies curricula. Selection was made from a file of concepts that is being organized for integrative purposes for the Natural Resources Education and Demonstration Center for DeKalb County. Sources of concepts are books, governmental publications and materials prepared by private agencies, associations, and foundations. Concepts in the file are organized according to concept and subconcept areas and according to primary, intermediate, and upper elementary levels. Levels were determined by the vocabulary used in the phrasing of concepts and by the teaching suggestions that often accompanied sources of concepts. The placement of concepts, however, is not restricted to any one level.

The 10 concepts selected from the concept file were recorded along with suggested learning experiences in a manner like that on Form IV, Figure 9, page 58(DeKalb Schools). In an implemented curriculum, Form IV would be completed for the benefit and convenience of classroom teachers. It indicates "points of integration" in the form of specific references to units and page numbers where opportunities for correlation can be found. Sample Form IV includes all recorded data for one concept. The learning experiences were selected for their relevancy to existing curriculum and

Figure 9. Sample of Form IV

Third Grade

Concepts	Integration	Learning Experiences	Justification
1. Homes are necessary in the environment of all people. Homes may be made from different kinds of materials. Soils help provide homes for people, (directly or indirectly)	Follett Social Studies Unit 1--People Who Make Our Homes pp.9-10 D.C. Heath Science Unit-The Earth's Cover pp.2-22	Classroom: Present the story of the Three Little Pigs, (movie, story telling, reading). Draw pictures of the houses built by the three pigs, or make models. Note: This story is obviously inappropriate as third grade "literature". It is the "familiar vehicle" used to develop the more sophisticated concept that each of the little pigs' building materials came from the soil. Share pictures, discuss materials, e.g., "Where did the first little pig get the straw?" (from a man) "Where did the man get it?"(from a field). "In what was it growing?" (in the soil). Continue with other pigs. Note: clay, a form of soil, is used in making bricks, and sand, another form of soil, is used in making mortar. Ask: "From what material is your home made?" List on board. Ask children to bring samples of materials used in building homes and pictures from magazines showing different types of homes. Arrange a bulletin board display. Outdoors: Take a field trip around the neighborhood to observe different kinds of homes. Watch building construction.	Since soil is necessary for the production of a materials used in homes, it is necessary that children understand that they must consider the other materials which homes are made

developmental level of the children. Sources were literature from which concepts were derived and references dealing with methods and techniques for conservation and outdoor education.

Collecting concepts is an on-going, continuous process in an implemented program. Many concepts and many learning experiences may contribute to a concept area. It is expected that concepts will change with a changing society. What may be pertinent today may have less potential attitude impact five years from now. The concept file is seen as a means to keep Natural Resources Education up to date.

CHAPTER IV

SUMMARY, FINDINGS, AND RECOMMENDATIONS FOR FURTHER STUDY

This chapter is organized as follows: 1) a summary of the study, 2) implications of the developed curriculum and 3) recommendations for further study.

I. SUMMARY

The plan and design for Natural Resources Education emerging from this study was dictated by the need for a new approach to conservation and natural resources education. It is increasingly important that Americans become apprised of resource problems and their remedies. There is little doubt in the minds of most educators that schools must play an important role in natural resources education.

Primary procedural objectives guiding the study were: (a) to develop an integrative conceptual structure having scope and sequence for primary, intermediate, and upper elementary developmental levels and, (b) to apply the developed curriculum structure, to be known as Natural Resources Education, to existing science and social studies curricula in the DeKalb County schools. Although the study is limited to a discussion of the conceptual structure, it

was recognized in the paper that further study of ways and means of influencing values and attitudes toward resources was needed.

The following priniciples determined on the basis of the philosophy of Natural Resources Education provided guidance and direction for curriculum construction.

1. The conceptual structure of Natural Resources Education must reflect this basic equation: MAN + NATURAL RESOURCES = SURVIVAL + DEVELOPMENT.
2. Natural resources concepts are best acquired in the context of the whole environment and in relation to the whole curriculum.
3. Concepts should constitute "recurrent themes". These are "threads" which run through the entire curricula in a cumulative and over-arching fashion.
4. Science and social studies are particularly relevant to natural resources education and are, therefore, appropriate avenues for integration.
5. Natural resources concepts should be stated in terms specific enough to suggest teaching experiences on the part of the teacher.

Twelve "broad understandings" were formulated to establish the basic framework of Natural Resources Education. These are:

1. Natural resources are everything man uses. They are in constant redefinition.
2. Man is dependent on the renewable resources for his survival.
3. Our industrial civilization depends on the nonrenewable resources--the metals and the fossil fuels.
4. Living things are interdependent with each other and with the physical environment.
5. Man as all other living things, is subject to the laws of nature.
6. Change is a fact of the environment. It is dynamic and inevitable.
7. The pressures of population and urbanization accelerate and increase resource use.
8. The amount and rate of resource use is determined by the economy.
9. Environmental quality cannot always be easily defined in economic terms.
10. Man has learned to use his environment wisely in a number of ways.

11. Government is active in the discovery, development, management, and protection of resources.
12. Everyone has the responsibility for conserving the resources around him.

A curriculum design was constructed to satisfy all of the structural requirements for the presentation of natural resources content. Concept and subconcept areas were established to correspond with the twelve broad understandings. Ten concepts are distributed over the concept areas at each grade level. The pattern of distribution reflects a curriculum emphasis on resources, environmental interdependency, and the individual and collective responsibility of citizens toward environment. Concepts spiral through five developmental levels. These are not restricted to any one level.

II. FINDINGS

A review of the literature has confirmed the researcher's opinion that the needs of children and the requirements for dynamic curriculum are not being met in conservation education.

Traditional conservation curriculum was criticized by Brandwein and Brennan as bein irrelevant to the needs of

children in a modern society and as having generally failed in its purposes. Train and Brandwein recommended an environmental approach to conservation education that would emphasize interrelatinnship and interdependency and Stapp called specifically for a program that spans the curriculum, kindergarten through twelfth grade. Barfield cited a need for an approach that would instill desirable attitudes and Strasser felt that the development of a proper value system is necessary to effect the conservation of resources. Combs and Taba pointed up the importance of "discovery" in the development of a value system. Integration as a concept of organization was specifically recommended as a desirable approach to conservation education by the U. S. Office of Education and by the American Association of School Administrators.

This study in natural resources education was planned to accomodate the foregoing recommendations. The emergent design satisfied all the structural requirements for a curriculum that emphasized environmental understandings, interrelated content, a spiral organization of concepts, scope and sequence, and flexibility in the placement level of concepts. The researcher recognizes, however, that the key to effective conservation or natural resources education lies in a successfully implemented program.

The fact that integrative programs are more often recommended than they are implemented leads the researcher to believe that the integrative procedure developed for Natural Resources Education is the most important contribution of this study. According to Taba, reluctance on the part of curriculum workers or teachers to depart from the disciplines, plus a lack of a basis for integration prevent successful unification of knowledge. Natural Resources Education establishes a basis for integration and it does not depart dramatically from traditional school organization. Since it is designed around existing science and social studies curricula it may be adopted or adapted for use in other school systems.

The following is evidence that the integrative plan was applied successfully to the curricula of the DeKalb County schools:

1. Analysis revealed sufficient and adequate relevant content existing in the science and social studies curricula to enable the researcher to develop an integrative plan and design.

2. The presence of relevant content permitted the development of satisfactory scope and sequence for Natural Resources Education.
3. Despite a variety of existing curriculum materials the researcher experienced no difficulty in applying the developed integrative procedure.

Endorsement of the curriculum for Natural Resources Education has come from a committee of teachers representing 18 DeKalb County schools. These teachers examined the sample Form IV, page 58 and commented favorably on its potential usefulness in the teaching situation.

A pilot program of Natural Resources Education will be launched in February, 1968, in DeKalb County, Illinois, under the auspices of the Natural Resources Education and Demonstration Center. This program will test the feasibility of the integrative procedure and the effectiveness of an environmental approach to conservation education.

III. RECOMMENDATIONS FOR FURTHER STUDY

Further study is necessary before final conclusions can be drawn regarding the feasibility and usefulness of

the plan and design. A pilot program must be followed carefully and data compiled over the period of operation. These data must be analyzed and evaluated and changes incorporated in the program if warranted.

Change is anticipated within the curriculum structure. As environmental education is ever more closely defined or is redefined in response to societal change, Natural Resources Education must reflect these changes. Concepts will be added or subtracted as existing science and social studies curricula evolve. The experiences or "organizing centers" for learning must earn their place in the curriculum. They should be tested to determine whether they truly stimulate learning about man and environment.

Attitudes and values and ways to influence them are being studied by the Natural Resources Education and Demonstration Center. The findings of this study should be significant to the implementation of a program of Natural Resources Education. An investigation of ways and means to evaluate attitude change should be launched prior to or in conjunction with the pilot study. Both quantitative and qualitative techniques should be investigated.

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